

Remarks

Applicant notes that the Patent Office has allowed pending claims 1 to 22. Claims 1 and 12 are amended.

Support for the Claim Amendments

The present invention relates to a package for optical micro-mechanical devices, comprising one or more optical micro-mechanical devices on the first surface of a die (see page 6, lines 24-25; and page 8, lines 3-4), the first surface of the die including a die reference surface (see page 2, line 24; and page 8, lines 3-4). The package also includes a package frame comprising an aperture and a first surface, the first surface of the package frame including a package frame reference surface proximate the aperture (see page 2, lines 25-26). The package frame reference surface is adapted to allow the die reference surface to be mounted to the package frame reference surface such that the optical micro-mechanical devices are located in the aperture (see, e.g., page 2, lines 25-27; page 3, lines 16-18; page 6, lines 19-23; page 10, lines 9-22; and Figs. 2-4). One or more optical interconnect alignment mechanisms located on the first surface of the package frame terminate adjacent to the aperture (see, e.g., page 2, lines 27-28; page 7, lines 1-6; page 8, lines 9-10; and Figs. 1-3).

Objections to the Drawings

The drawings were objected to because the cross-hatching of the insulative parts (20) indicates a metallic material. The drawings were further objected to as the Patent Office asserted that the cross-hatching of the flex circuit (60) should indicate a conductive material rather than an insulative material. The drawings were further objected to for failure to show every feature of the invention specified in the claims. Specifically, the aperture (22), in for example Figs. 2 and 3, is shown as a solid block of insulative material. In addition to responding to these objections, Applicant has amended the drawings to correct errors in the drawings as originally filed.

Fig. 1 has been amended as follows:

The line format of the die (24) has been changed to “phantom.” Support for this amendment is found on page 6, lines 23-24.

Fig. 2 has been amended as follows:

The cross-hatching of the package frame (20) has been changed to indicate an insulative part. Support for this amendment is found at page 7, lines 7-24.

The cross-hatching has been removed from the aperture (22). Support for this amendment is found at page 9, lines 28-31.

The line format for optical micro-mechanical devices (43) has been changed to “phantom.” Support for this amendment is found at page 7, line 31-page 8, line 1.

The cross-hatching for the flex circuit (60) has been changed to indicate a conductive material. Support for this amendment is found at page 8, lines 24-26.

The cross-hatching has been removed from the lenses (70) shown in end-view. Support for this amendment is found at page 2, lines 27-31.

Fig. 3 has been amended as follows:

The cross-hatching of the package frame (20) has been changed to indicate an insulative part. Support for this amendment is found at page 7, lines 7-24.

The cross-hatching has been removed from the aperture (22). Support for this amendment is found at page 9, lines 28-31.

The line format for optical micro-mechanical devices (43) has been changed to “phantom.” Support for this amendment is found at page 7, line 31-page 8, line 1.

The cross-hatching for the flex circuit (60) has been changed to indicate a conductive material. Support for this amendment is found at page 8, lines 24-26.

The cross-hatching has been removed from the lenses (70) shown in end-view. Support for this amendment is found at page 2, lines 27-31.

Fig. 4 has been amended as follows:

The cross-hatching of the package frame has been changed to indicate an insulative part. Support for this amendment is found at page 7, lines 7-24.

The cross-hatching has been removed from the aperture. Support for this amendment is found at page 9, lines 28-31.

The line format for optical micro-mechanical devices (43) has been changed to “phantom.” Support for this amendment is found at page 7, line 31-page 8, line 1.

The cross-hatching has been removed from the lenses shown in end-view. Support for this amendment is found at page 2, lines 27-31.

Fig. 5 has been amended as follows:

The cross-hatching of the package frame (86) has been changed to indicate an insulative part. Support for this amendment is found at page 7, lines 7-24.

The cross-hatching has been removed from the aperture. Support for this amendment is found at page 9, lines 28-31.

The line format for optical micro-mechanical devices has been changed to “phantom.” Support for this amendment is found at page 7, line 31-page 8, line 1.

The cross-hatching for the flex circuit (92) has been changed to indicate a conductive material. Support for this amendment is found at page 11, lines 4-6.

The cross-hatching has been removed from the lenses shown in end-view. Support for this amendment is found at page 2, lines 27-31.

Fig. 6 has been amended as follows:

The line format for the die (104) has been changed to “phantom.” Support for this amendment is found at page 11, lines 30-31.

Fig. 7 has been amended as follows:

The cross-hatching of the package frame (100) has been changed to indicate an insulative part. Support for this amendment is found at page 7, lines 7-24.

The cross-hatching has been removed from the aperture (102). Support for this amendment is found at page 9, lines 28-31.

The cross-hatching for the flex circuit (136) has been changed to indicate a conductive material. Support for this amendment is found at page 12, lines 23-27.

The cross-hatching has been removed from the lenses (126) shown in end-view. Support for this amendment is found at page 2, lines 27-31.

Fig. 8 has been amended as follows:

The cross-hatching of the package frame (**100**) has been changed to indicate an insulative part. Support for this amendment is found at page 7, lines 7-24.

The cross-hatching has been removed from the aperture. Support for this amendment is found at page 9, lines 28-31.

The cross-hatching for the flex circuit (**158**) has been changed to indicate a conductive material. Support for this amendment is found at page 13, lines 2-3.

The cross-hatching has been removed from the lenses shown in end-view. Support for this amendment is found at page 2, lines 27-31.

Fig. 10 has been amended as follows:

The cross-hatching of the package frame (**216**) has been changed to indicate an insulative part. Support for this amendment is found at page 7, lines 7-24.

The cross-hatching has been removed from the aperture. Support for this amendment is found at page 9, lines 28-31.

The cross-hatching for the flex circuit has been changed to indicate a conductive material. Support for this amendment is found at, e.g., page 13, lines 2-3.

The line format for optical micro-mechanical devices (**224**) has been changed to “phantom.” Support for this amendment is found at page 7, line 31 – page 8, line 1.

The cross-hatching has been removed from the lenses (**230**) shown in end-view. Support for this amendment is found at page 2, lines 27-31.

Fig. 12 has been amended as follows:

The cross-hatching of the package frame (**314**) has been changed to indicate an insulative part. Support for this amendment is found at page 7, lines 7-24.

The cross-hatching has been removed from the aperture (**312**). Support for this amendment is found at page 9, lines 28-31.

The line format for optical micro-mechanical devices (**310**) has been changed to “phantom.” Support for this amendment is found at page 7, line 31-page 8, line 1.

The cross-hatching for the flex circuit (318) has been changed to indicate a conductive material. Support for this amendment is found at page 14, lines 12-15.

The cross-hatching has been removed from the lenses (306) shown in end-view. Support for this amendment is found at page 2, lines 27-31.

Applicant submits no new matter has been entered. Applicant respectfully requests the objections to the drawings be withdrawn.

Objections to the Specification

The specification was objected to for failure to provide a proper antecedent basis for the claimed subject matter. Claim 1, for example, recited a substrate and the Patent Office asserted that said substrate was not shown in the drawings nor discussed in the specification.

Applicant believes that the amendments to claims 1 and 12 render this objection moot.

Applicant respectfully requests the objection to the specification be withdrawn.

Objections to the Disclosure

The disclosure was objected to because of the following informalities: The claims discuss “the frame reference surface ... adapted to receive the die reference surface.” The Patent Office asserts that, according to the specification and drawings, it seems that these surfaces are in contact, not one receiving the other.

Claims 1 and 12 have been amended. Support for the amendments can be found at, e.g., Figs. 2-3; page 7, lines 25-29; page 8, lines 9-10; and page 10, lines 9-13.

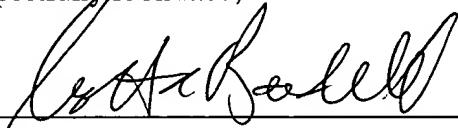
Applicant respectfully requests that the objections to the disclosure be withdrawn

In view of the above, it is submitted that the application is in condition for allowance. Reconsideration of the application is requested.

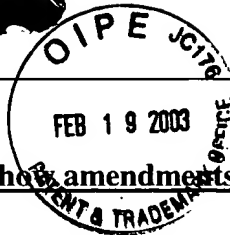
Allowance of claims 1-22, as amended, at an early date is solicited.

Respectfully submitted,

10 February, 2003
Date

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3M Innovative Properties Company
Facsimile No.: 651-736-3833



Version with markings to show amendments made:

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1. (Amended) A package for optical micro-mechanical devices, comprising:
[a die comprising] one or more optical micro-mechanical devices on a first surface of a die [substrate], the first surface of the die including a die reference surface;
a tooling fixture attached to a second surface of the die;
a package frame comprising an aperture and a first surface, the first surface of the package frame comprising a package frame reference surface proximate the aperture, wherein the package frame reference surface is adapted to allow [receive] the die reference surface to be mounted to the package frame reference surface such that the optical micro-mechanical devices are located in the aperture;

one or more optical interconnect alignment mechanisms located on the first surface of the package frame and terminating adjacent to the aperture; and

distal ends of one or more optical interconnects located in the optical interconnect alignment mechanisms and optically coupled with one or more of the optical micro-mechanical devices.

12. (Amended) A method of packaging optical micro-mechanical devices, comprising:
preparing a die comprising one or more optical micro-mechanical devices on a first surface of the die [a substrate], the first surface of the die including a die reference surface;

attaching a tooling fixture to a second surface of the die [substrate];

preparing a package frame including an aperture and a first surface, the first surface of the package frame comprising a package frame reference surface proximate the aperture, wherein the package frame reference surface is adapted to allow [receive] the die reference surface to be mounted to the package frame reference surface such that the optical micro-mechanical devices are located in the aperture; and

preparing one or more optical interconnect alignment mechanisms on the first surface of the package frame, the optical interconnect alignment mechanisms on the package frame being positioned to align with corresponding optical micro-mechanical devices on the die when the die reference surface is mounted to [engaged with] the package frame reference surface.

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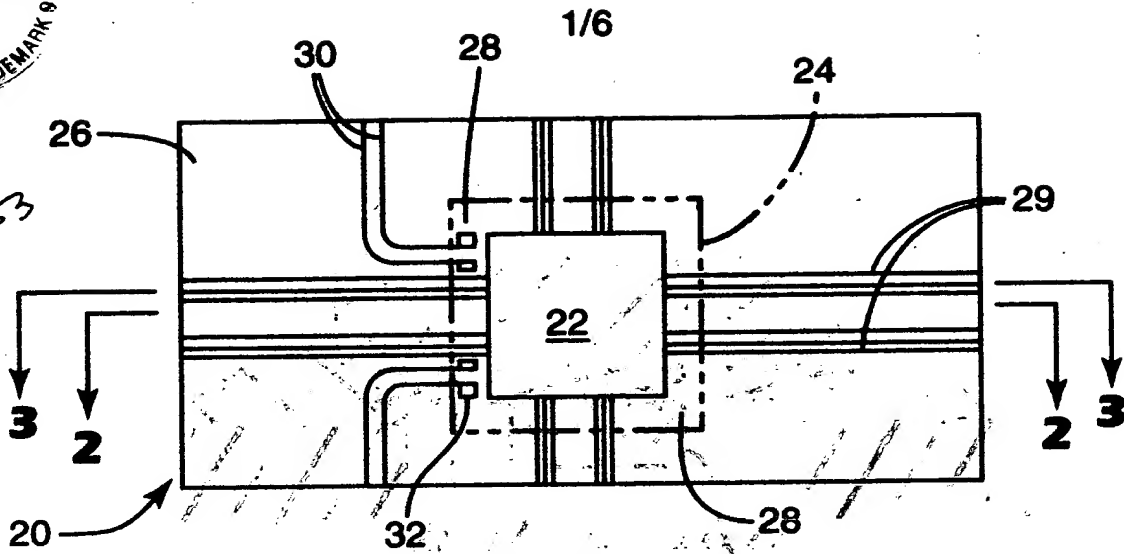


FIG. 1

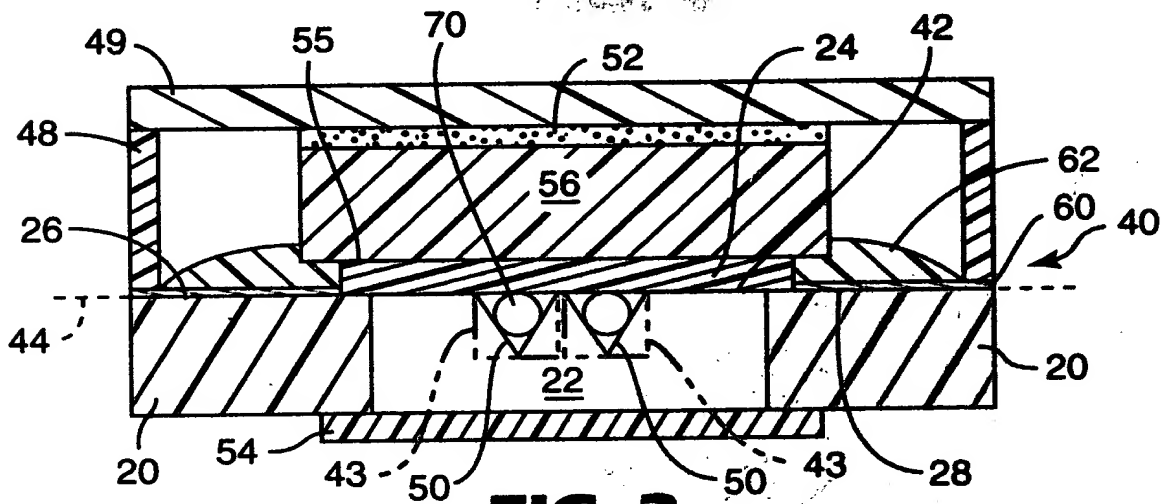


FIG. 2

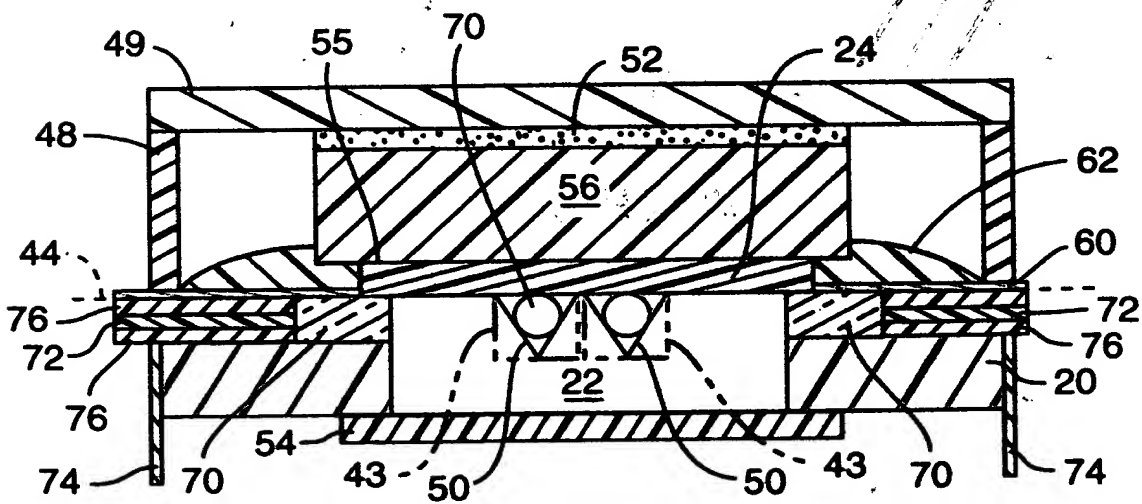


FIG. 3

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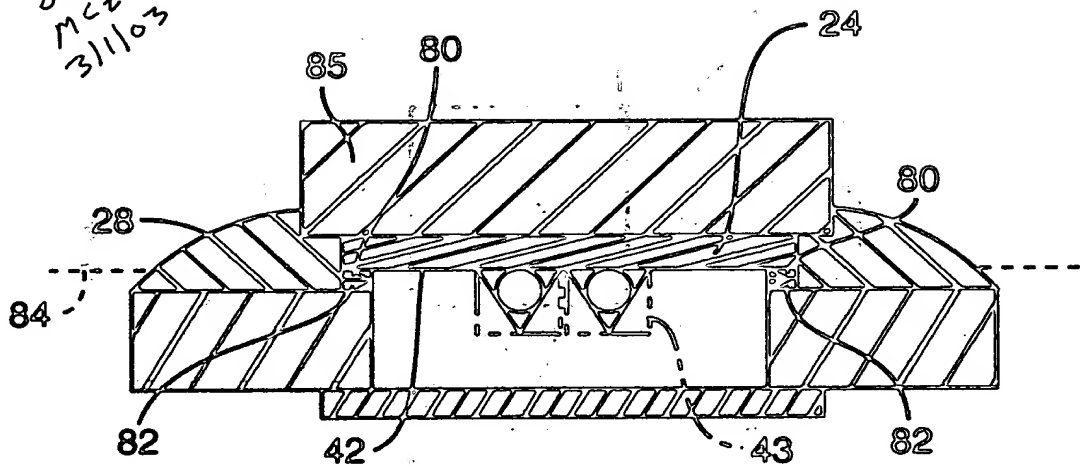


FIG. 4

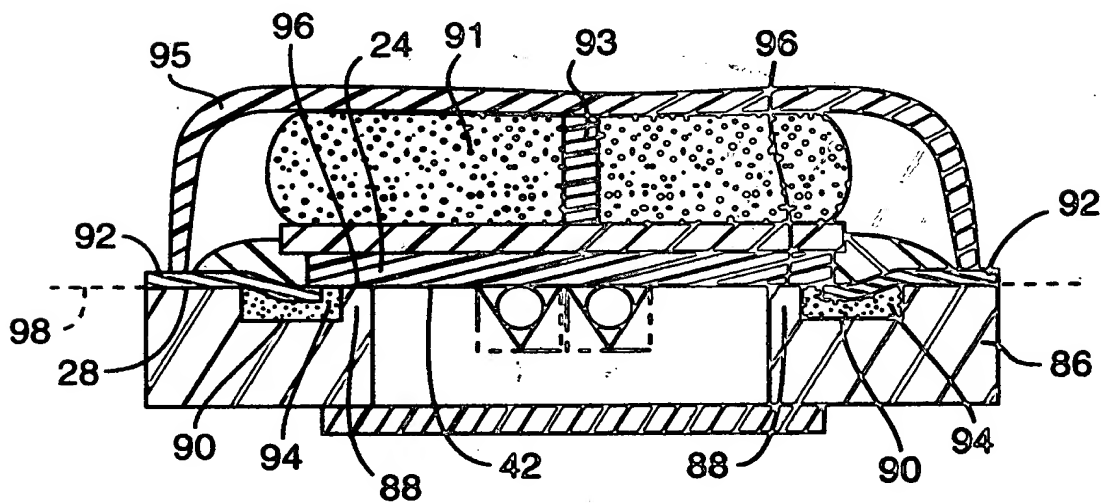


FIG. 5

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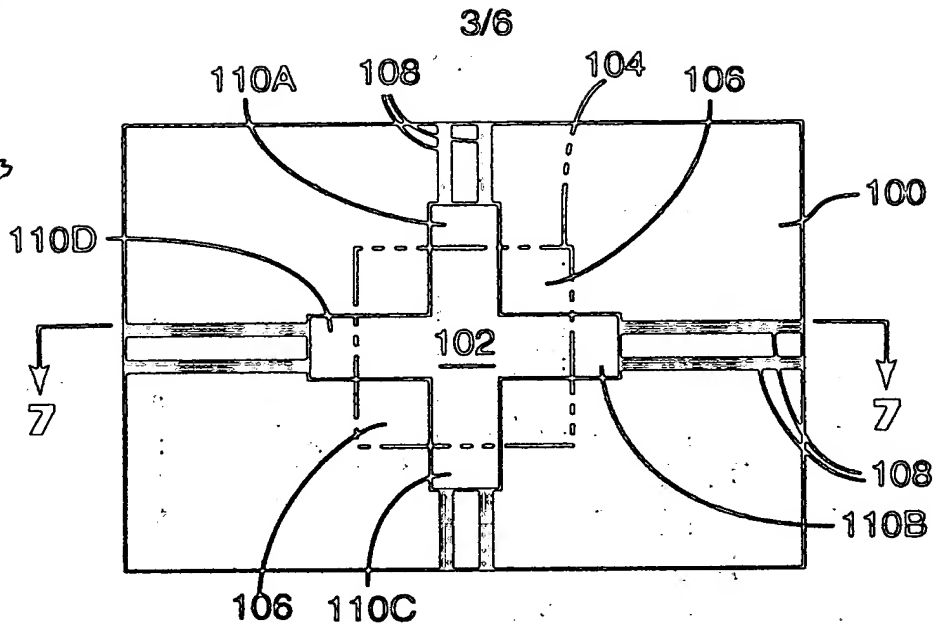


FIG. 6

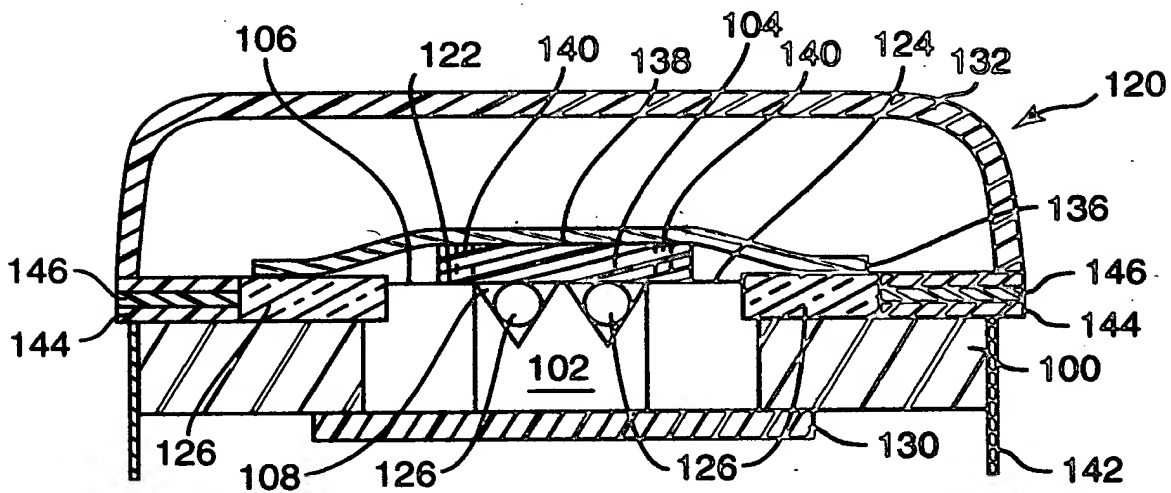


FIG. 7

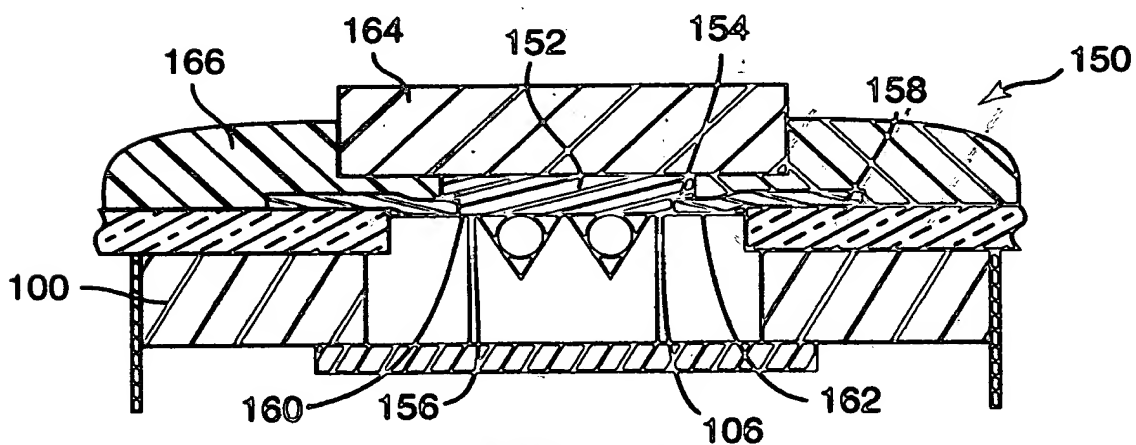


FIG. 8



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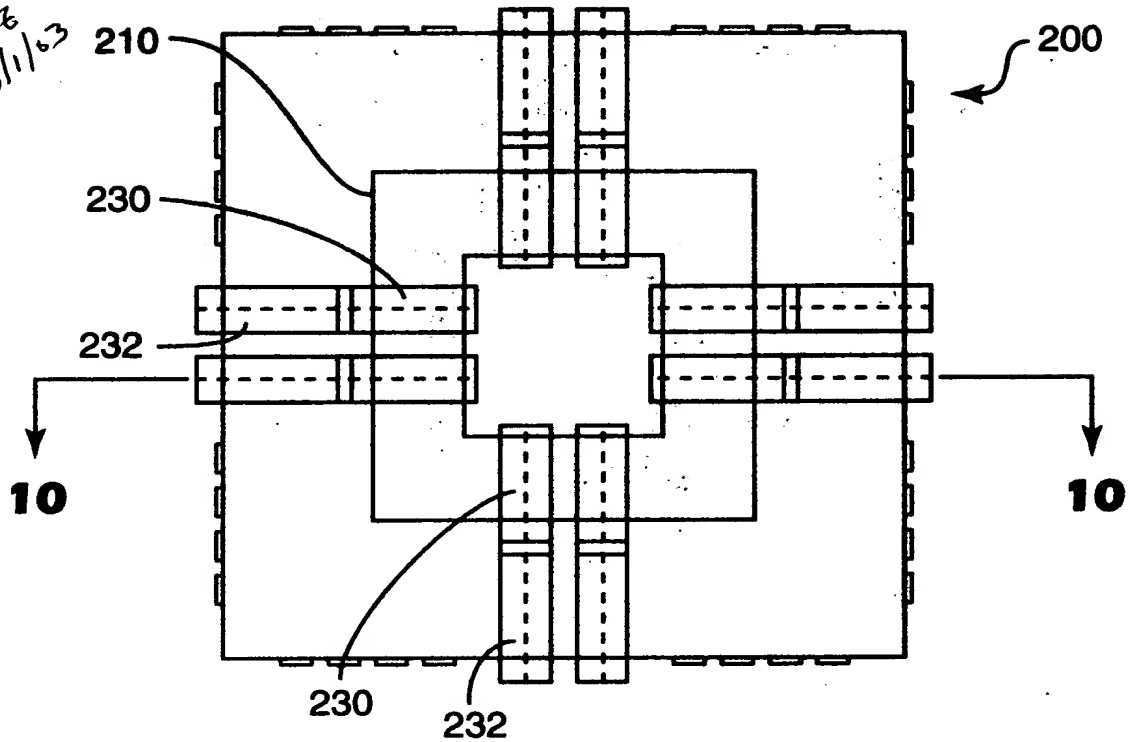


FIG. 9

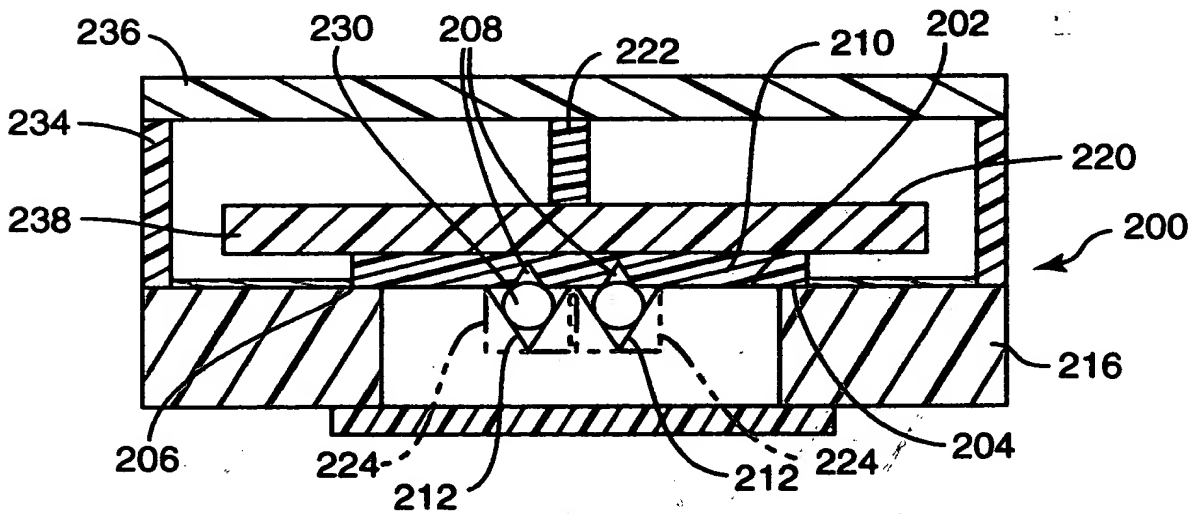


FIG. 10

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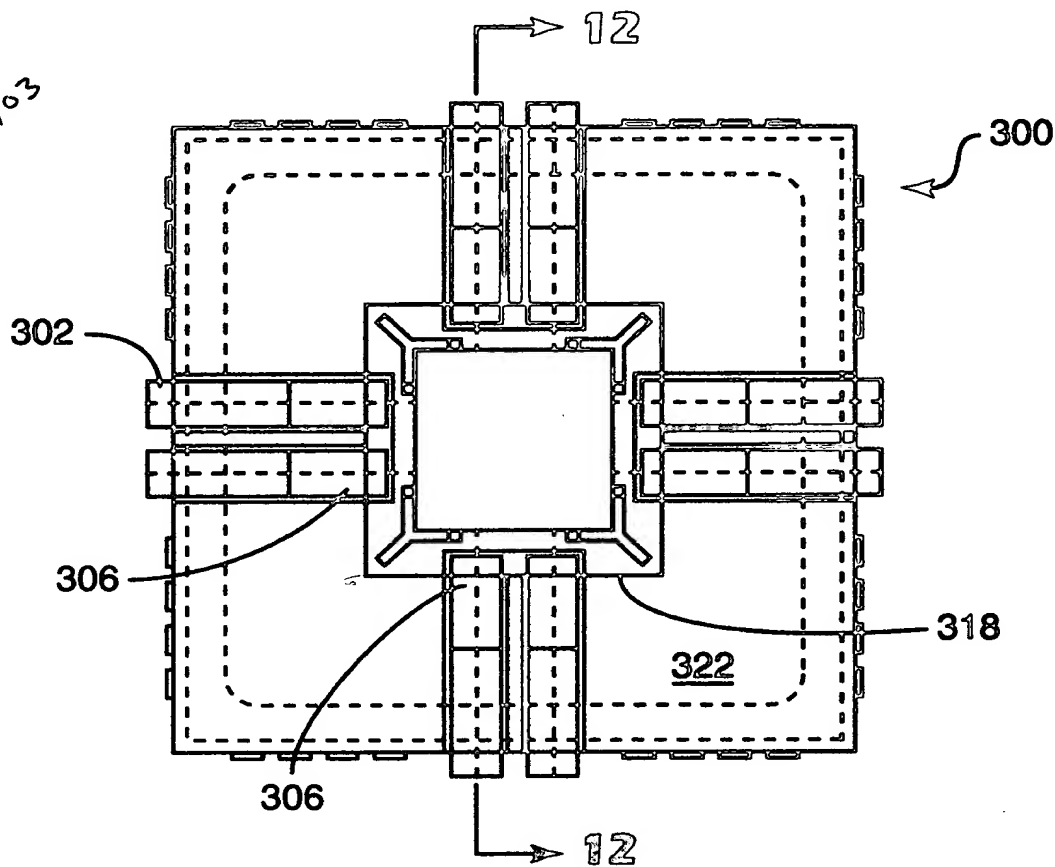


FIG. 11

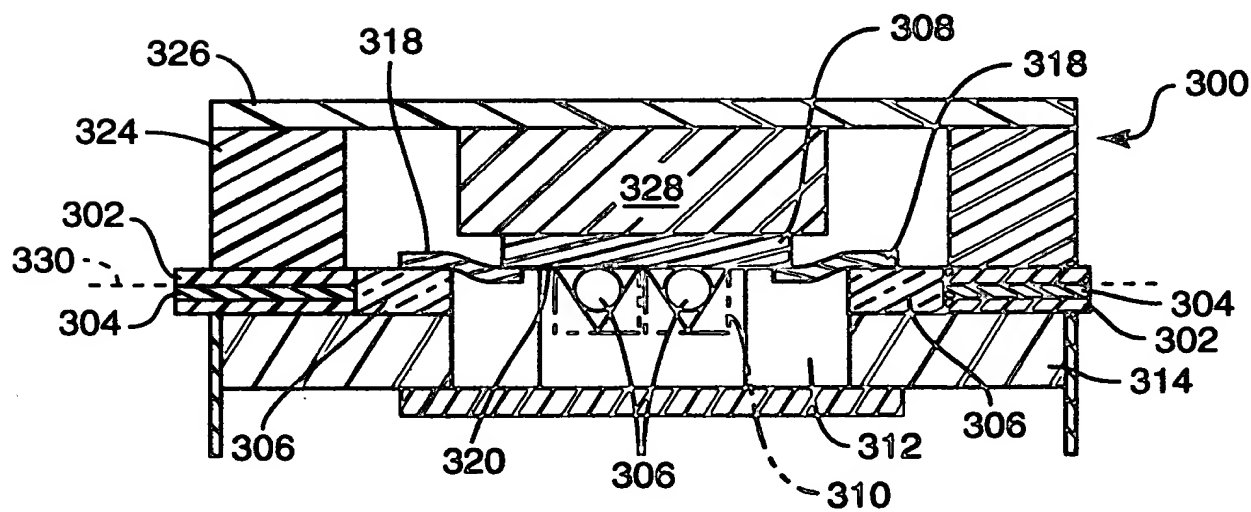


FIG. 12

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F E B 1 9 2 0 0 3
P A T E N T & T R A D E M A R K O F F I C E

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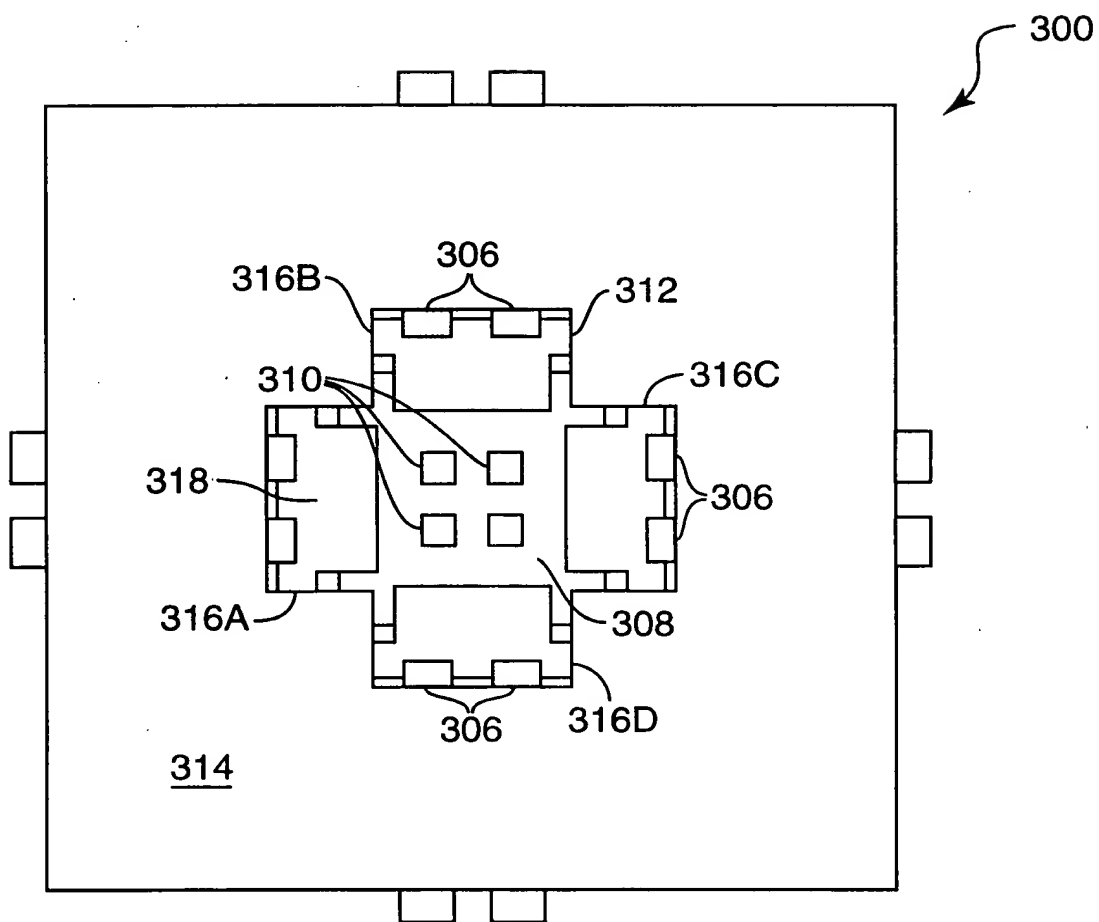


FIG. 13